

## CLAIMS

What is claimed is:

1     1.     A method for managing configuration data for a router, the method comprising the  
2             machine-implemented steps of:  
3             querying the router to determine a plurality of functional areas supported by the  
4                     router;  
5             generating and displaying a plurality of user interface objects on a graphical user  
6                     interface, wherein each user interface object from the plurality of user  
7                     interface objects corresponds to configuration data for one of the plurality of  
8                     functional areas supported by the router; and  
9             in response to detecting a user selection of a particular user interface object from the  
10             plurality of user interface objects,  
11             allowing the user to modify the configuration data corresponding to the  
12                     particular user interface object to generate modified configuration data;  
13             and  
14             sending the modified configuration data to the router.

1     2.     A machine-readable medium for managing configuration data for a router, the  
2             machine-readable medium carrying instructions which, when executed by one or more  
3             processors, cause the one or more processors to perform the steps of:  
4             querying the router to determine a plurality of functional areas supported by the  
5                     router;  
6             generating and displaying a plurality of user interface objects on a graphical user

7 interface, wherein each user interface object from the plurality of user  
8 interface objects corresponds to configuration data for one of the plurality of  
9 functional areas supported by the router; and  
10 in response to detecting a user selection of a particular user interface object from the  
11 plurality of user interface objects,  
12 allowing the user to modify the configuration data corresponding to the  
13 particular user interface object to generate modified configuration data;  
14 and  
15 sending the modified configuration data to the router.

- 1 3. An apparatus for managing configuration data for a router, the apparatus comprising a  
2 memory storing instructions which, when executed by one or more processors, cause  
3 the one or more processors to perform the steps of:  
4 querying the router to determine a plurality of functional areas supported by the  
5 router;  
6 generating and displaying a plurality of user interface objects on a graphical user  
7 interface, wherein each user interface object from the plurality of user  
8 interface objects corresponds to configuration data for one of the plurality of  
9 functional areas supported by the router; and  
10 in response to detecting a user selection of a particular user interface object from the  
11 plurality of user interface objects,  
12 allowing the user to modify the configuration data corresponding to the  
13 particular user interface object to generate modified configuration data;

14 and  
15 sending the modified configuration data to the router.

1 4. A method for managing network device configuration data, the method comprising  
2 the machine-implemented steps of:  
3 determining a plurality of functional areas supported by a network device; and  
4 generating and displaying a plurality of user interface objects on a graphical user  
5 interface, wherein each user interface object from the plurality of user  
6 interface objects corresponds to configuration data for one of the plurality of  
7 functional areas supported by the network device.

1 5. The method as recited in Claim 4, further comprising the machine-implemented step  
2 of selecting the visual appearance of a particular user interface object from the  
3 plurality of user interface objects to reflect a state of the configuration data  
4 corresponding to the particular user interface object.

1 6. The method as recited in Claim 4, further comprising the machine-implemented step  
2 of in response to detecting a user selection of a particular user interface object from  
3 the plurality of user interface objects,  
4 retrieving, from the network device, configuration data corresponding to the  
5 particular user interface object,  
6 allowing the user to modify the configuration data corresponding to the  
7 particular user interface object to generate modified configuration data,

8

and

9

sending only the modified configuration data to the network device.

1

7. The method as recited in Claim 6, further comprising the machine-implemented step of launching one or more of a plurality of application programs to allow the user to modify the configuration data corresponding to the particular user interface object..

2

3

1

8. The method as recited in Claim 6, further comprising the machine-implemented step of changing the visual appearance of the particular user interface object to indicate to the user that the configuration data corresponding to the particular user interface object has been modified.

2

3

4

1

9. The method as recited in Claim 6, further comprising the machine-implemented step of in response to detecting a user selection of another user interface object associated with committing changes in configuration data on network devices, sending to the network device a request for the network device to implement the modified configuration data.

2

3

4

5

1

10. The method as recited in Claim 9, further comprising the machine-implemented step of in response to receiving a notification from the network device that the modified configuration data has been implemented by the network device, changing the visual appearance of the particular user interface object to indicate to the user that the modified configuration data has been implemented by the network device.

2

3

4

5

1 11. The method as recited in Claim 4, further comprising the machine-implemented step  
2 of in response to determining that a particular functional area of the configuration data  
3 has been modified after the particular functional area of configuration data was  
4 received from the network device, changing the visual appearance of a particular user  
5 interface object from the plurality of user interface objects to visually indicate to a  
6 user that the particular functional area of the configuration data has been modified  
7 after the particular functional area of configuration data was received from the  
8 network device.

1 12. The method as recited in Claim 4, wherein the step of determining a plurality of  
2 functional areas supported by a network device includes querying the network device  
3 to determine the plurality of functional areas supported by a network device.

1 13. The method as recited in Claim 4, wherein the step of determining a plurality of  
2 functional areas supported by a network device includes determining a plurality of  
3 functional areas supported by a network device and for which the network device and  
4 a client have compatible configuration application program interfaces.

1 14. The method as recited in Claim 4, further comprising the machine-implemented steps  
2 of:  
3 in response to detecting a user selection of a particular user interface object from the  
4 plurality of user interface objects,

5           retrieving, from the network device, configuration data corresponding to the  
6           particular user interface object,  
7           displaying the configuration data on a graphical user interface; and  
8           in response to detecting that the configuration data retrieved from the network device  
9           is no longer consistent with configuration data implemented on the network  
10          device, changing the visual appearance of the particular user interface object  
11          to indicate that the configuration data retrieved from the network device is no  
12          longer consistent with configuration data implemented on the network device.

1    15.    A machine-readable medium for managing network device configuration data, the  
2           machine-readable medium carrying instructions which, when executed by one or more  
3           processors, cause the one or more processors to perform the steps of:  
4           determining a plurality of functional areas supported by a network device; and  
5           generating and displaying a plurality of user interface objects on a graphical user  
6           interface, wherein each user interface object from the plurality of user  
7           interface objects corresponds to configuration data for one of the plurality of  
8           functional areas supported by the network device.

1    16.    The machine-readable medium as recited in Claim 15, further comprising one or more  
2           additional instructions which, when executed by the one or more processors, cause the  
3           one or more processors to perform the step of selecting the visual appearance of a  
4           particular user interface object from the plurality of user interface objects to reflect a  
5           state of the configuration data corresponding to the particular user interface object.

1     17.     The machine-readable medium as recited in Claim 15, further comprising one or more  
2             additional instructions which, when executed by the one or more processors, cause the  
3             one or more processors to perform the step of in response to detecting a user selection  
4             of a particular user interface object from the plurality of user interface objects,  
5                     retrieving, from the network device, configuration data corresponding to the  
6                     particular user interface object,  
7                     allowing the user to modify the configuration data corresponding to the  
8                     particular user interface object to generate modified configuration data,  
9                     and  
10             sending only the modified configuration data to the network device.

1     18.     The machine-readable medium as recited in Claim 17, further comprising one or more  
2             additional instructions which, when executed by the one or more processors, cause the  
3             one or more processors to perform the step of launching one or more of a plurality of  
4             application programs to allow the user to modify the configuration data corresponding  
5             to the particular user interface object.

1     19.     The machine-readable medium as recited in Claim 17, further comprising one or more  
2             additional instructions which, when executed by the one or more processors, cause the  
3             one or more processors to perform the step of changing the visual appearance of the  
4             particular user interface object to indicate to the user that the configuration data  
5             corresponding to the particular user interface object has been modified.

1     20.     The machine-readable medium as recited in Claim 17, further comprising one or more  
2             additional instructions which, when executed by the one or more processors, cause the  
3             one or more processors to perform the step of in response to detecting a user selection  
4             of another user interface object associated with committing changes in configuration  
5             data on network devices, sending to the network device a request for the network  
6             device to implement the modified configuration data.

1     21.     The machine-readable medium as recited in Claim 20, further comprising one or more  
2             additional instructions which, when executed by the one or more processors, cause the  
3             one or more processors to perform the step of in response to receiving a notification  
4             from the network device that the modified configuration data has been implemented  
5             by the network device, changing the visual appearance of the particular user interface  
6             object to indicate to the user that the modified configuration data has been  
7             implemented by the network device.

1     22.     The machine-readable medium as recited in Claim 15, further comprising one or more  
2             additional instructions which, when executed by the one or more processors, cause the  
3             one or more processors to perform the step of in response to determining that a  
4             particular functional area of the configuration data has been modified after the  
5             particular functional area of configuration data was received from the network device,  
6             changing the visual appearance of a particular user interface object from the plurality  
7             of user interface objects to visually indicate to a user that the particular functional area



8 of the configuration data has been modified after the particular functional area of  
9 configuration data was received from the network device.

1 23. The machine-readable medium as recited in Claim 15, wherein the step of  
2 determining a plurality of functional areas supported by a network device includes  
3 querying the network device to determine the plurality of functional areas supported  
4 by a network device.

1 24. The machine-readable medium as recited in Claim 15, wherein the step of  
2 determining a plurality of functional areas supported by a network device includes  
3 determining a plurality of functional areas supported by a network device and for  
4 which the network device and a client have compatible configuration application  
5 program interfaces.

1 25. The machine-readable medium as recited in Claim 15, further comprising one or more  
2 additional instructions which, when executed by the one or more processors, cause the  
3 one or more processors to perform the steps of:  
4 in response to detecting a user selection of a particular user interface object from the  
5 plurality of user interface objects,  
6 retrieving, from the network device, configuration data corresponding to the  
7 particular user interface object,  
8 displaying the configuration data on a graphical user interface; and  
9 in response to detecting that the configuration data retrieved from the network

10 device is no longer consistent with configuration data implemented on  
11 the network device, changing the visual appearance of the particular  
12 user interface object to indicate that the configuration data retrieved  
13 from the network device is no longer consistent with configuration  
14 data implemented on the network device.

1 26. An apparatus for managing network device configuration data, the apparatus  
2 comprising a memory storing instructions which, when executed by one or more  
3 processors, cause the one or more processors to perform the steps of:  
4 determining a plurality of functional areas supported by a network device; and  
5 generating and displaying a plurality of user interface objects on a graphical user  
6 interface, wherein each user interface object from the plurality of user  
7 interface objects corresponds to configuration data for one of the plurality of  
8 functional areas supported by the network device.

1 27. The apparatus as recited in Claim 26, wherein the memory further comprises one or  
2 more additional instructions which, when executed by the one or more processors,  
3 cause the one or more processors to perform the step of selecting the visual  
4 appearance of a particular user interface object from the plurality of user interface  
5 objects to reflect a state of the configuration data corresponding to the particular user  
6 interface object.

1     28.     The apparatus as recited in Claim 26, wherein the memory further comprises one or  
2             more additional instructions which, when executed by the one or more processors,  
3             cause the one or more processors to perform the step of in response to detecting a user  
4             selection of a particular user interface object from the plurality of user interface  
5             objects,  
6             retrieving, from the network device, configuration data corresponding to the  
7             particular user interface object,  
8             allowing the user to modify the configuration data corresponding to the  
9             particular user interface object to generate modified configuration data,  
10            and  
11            sending only the modified configuration data to the network device.

1     29.     The apparatus as recited in Claim 28, wherein the memory further comprises one or  
2             more additional instructions which, when executed by the one or more processors,  
3             cause the one or more processors to perform the step of launching one or more of a  
4             plurality of application programs to allow the user to modify the configuration data  
5             corresponding to the particular user interface object.

1     30.     The apparatus as recited in Claim 28, wherein the memory further comprises one or  
2             more additional instructions which, when executed by the one or more processors,  
3             cause the one or more processors to perform the step of changing the visual  
4             appearance of the particular user interface object to indicate to the user that the

5 configuration data corresponding to the particular user interface object has been  
6 modified.

1 31. The apparatus as recited in Claim 28, wherein the memory further comprises one or  
2 more additional instructions which, when executed by the one or more processors,  
3 cause the one or more processors to perform the step of in response to detecting a user  
4 selection of another user interface object associated with committing changes in  
5 configuration data on network devices, sending to the network device a request for the  
6 network device to implement the modified configuration data.

1 32. The apparatus as recited in Claim 31, wherein the memory further comprises one or  
2 more additional instructions which, when executed by the one or more processors,  
3 cause the one or more processors to perform the step of in response to receiving a  
4 notification from the network device that the modified configuration data has been  
5 implemented by the network device, changing the visual appearance of the particular  
6 user interface object to indicate to the user that the modified configuration data has  
7 been implemented by the network device.

1 33. The apparatus as recited in Claim 26, wherein the memory further comprises one or  
2 more additional instructions which, when executed by the one or more processors,  
3 cause the one or more processors to perform the step of in response to determining  
4 that a particular functional area of the configuration data has been modified after the  
5 particular functional area of configuration data was received from the network device,

6 changing the visual appearance of a particular user interface object from the plurality  
7 of user interface objects to visually indicate to a user that the particular functional area  
8 of the configuration data has been modified after the particular functional area of  
9 configuration data was received from the network device.

1 34. The apparatus as recited in Claim 26, wherein the step of determining a plurality of  
2 functional areas supported by a network device includes querying the network device  
3 to determine the plurality of functional areas supported by a network device.

1 35. The apparatus as recited in Claim 26, wherein the step of determining a plurality of  
2 functional areas supported by a network device includes determining a plurality of  
3 functional areas supported by a network device and for which the network device and  
4 a client have compatible configuration application program interfaces.

1 36. The apparatus as recited in Claim 26, wherein the memory further comprises one or  
2 more additional instructions which, when executed by the one or more processors,  
3 cause the one or more processors to perform the steps of:  
4 in response to detecting a user selection of a particular user interface object from the  
5 plurality of user interface objects,  
6 retrieving, from the network device, configuration data corresponding to the  
7 particular user interface object,  
8 displaying the configuration data on a graphical user interface; and  
9 in response to detecting that the configuration data retrieved from the network

10 device is no longer consistent with configuration data implemented on  
11 the network device, changing the visual appearance of the particular  
12 user interface object to indicate that the configuration data retrieved  
13 from the network device is no longer consistent with configuration  
14 data implemented on the network device.

1 37. A method for updating configuration data on a network device, wherein the  
2 configuration data includes configuration data for a plurality of functional areas  
3 supported by the network device the method comprising the machine-implemented  
4 steps of:  
5 displaying the configuration data on a graphical user interface;  
6 in response to a user changing a value of a configuration data item for one of the  
7 functional areas to a new value, updating values of the same configuration  
8 data item in the other functional areas from the plurality of functional areas to  
9 the new value to create updated configuration data; and  
10 providing the updated configuration data to the network device.

1 38. The method as recited in Claim 37, further comprising the machine-implemented  
2 steps of:  
3 in response to a user adding a new data item for one of the functional areas, adding  
4 the new data items to the other functional areas from the plurality of functional  
5 areas to the new value to create updated configuration data; and  
6 providing the updated configuration data to the network device.

1    39.    A method for updating configuration data on a network device, wherein the  
2           configuration data includes configuration data for a plurality of functional areas  
3           supported by the network device, the method comprising the machine-implemented  
4           steps of:  
5           displaying the configuration data on a graphical user interface;  
6           detecting a user selection of a user interface object that corresponds to one or more  
7           data items from a first functional area from the plurality of functional areas;  
8           in response to detecting a user selection of a graphical user interface object associated  
9           with performing a copy and paste operation, overwriting values of one or more  
10           other data items from the first functional area with values of the one or more  
11           data items to create updated configuration data; and  
12           providing the updated configuration data to the network device.

1    40.    A method for updating configuration data on a network device, wherein the  
2           configuration data includes configuration data for a functional area supported by the  
3           network device, the method comprising the machine-implemented steps of:  
4           displaying the configuration data on a graphical user interface;  
5           in response to detecting a user selection of a graphical user interface object associated  
6           with performing a clone operation, generating a specified number of copies of  
7           the configuration data for a specified number of other functional areas to  
8           create updated configuration data; and  
9           providing the updated configuration data to the network device.

1 41. The method as recited in Claim 40, wherein values of the specified number of copies  
2 of the configuration data are the same as values of the configuration data.

1 42. The method as recited in Claim 40, further comprising the machine-implemented step  
2 of determining a value for a data item in one of the specified number of copies of the  
3 configuration data by applying an algorithm to a value for the data item in the  
4 configuration data.

1 43. A machine-readable medium for updating configuration data on a network device,  
2 wherein the configuration data includes configuration data for a plurality of functional  
3 areas supported by the network device; the machine-readable medium carrying  
4 instructions which, when executed by one or more processors, cause the one or more  
5 processors to perform the steps of:  
6 displaying the configuration data on a graphical user interface;  
7 in response to a user changing a value of a configuration data item for one of the  
8 functional areas to a new value, updating values of the same configuration  
9 data item in the other functional areas from the plurality of functional areas to  
10 the new value to create updated configuration data; and  
11 providing the updated configuration data to the network device.



1    44.    The machine-readable medium as recited in Claim 43, further comprising one or more  
2           additional instructions which, when executed by the one or more processors, cause the  
3           one or more processors to perform the steps of:  
4           in response to a user adding a new data item for one of the functional areas, adding  
5           the new data items to the other functional areas from the plurality of functional  
6           areas to the new value to create updated configuration data; and  
7           providing the updated configuration data to the network device.

1    45.    A machine-readable medium for updating configuration data on a network device,  
2           wherein the configuration data includes configuration data for a plurality of functional  
3           areas supported by the network device, the machine-readable medium carrying  
4           instructions which, when executed by one or more processors, cause the one or more  
5           processors to perform the steps of:  
6           displaying the configuration data on a graphical user interface;  
7           detecting a user selection of a user interface object that corresponds to one or more  
8           data items from a first functional area from the plurality of functional areas;  
9           in response to detecting a user selection of a graphical user interface object associated  
10           with performing a copy and paste operation, overwriting values of one or more  
11           other data items from the first functional area with values of the one or more  
12           data items to create updated configuration data; and  
13           providing the updated configuration data to the network device.

1     46.     A machine-readable medium for updating configuration data on a network device,  
2             wherein the configuration data includes configuration data for a functional area  
3             supported by the network device, the machine-readable medium carrying instructions  
4             which, when executed by one or more processors, cause the one or more processors to  
5             perform the steps of:  
6             displaying the configuration data on a graphical user interface;  
7             in response to detecting a user selection of a graphical user interface object associated  
8                     with performing a clone operation, generating a specified number of copies of  
9                     the configuration data for a specified number of other functional areas to  
10                    create updated configuration data; and  
11            providing the updated configuration data to the network device.

1     47.     The machine-readable medium as recited in Claim 46, wherein values of the specified  
2             number of copies of the configuration data are the same as values of the configuration  
3             data.

1     48.     The machine-readable medium as recited in Claim 46, further comprising one or more  
2             additional instructions which, when executed by the one or more processors, cause the  
3             one or more processors to perform the step of determining a value for a data item in  
4             one of the specified number of copies of the configuration data by applying an  
5             algorithm to a value for the data item in the configuration data.

1     49.     An apparatus for updating configuration data on a network device, wherein the  
2             configuration data includes configuration data for a plurality of functional areas  
3             supported by the network device, the apparatus comprising a memory storing  
4             instructions which, when executed by one or more processors, cause the one or more  
5             processors to perform the steps of:  
6             displaying the configuration data on a graphical user interface;  
7             in response to a user changing a value of a configuration data item for one of the  
8                     functional areas to a new value, updating values of the same configuration  
9                     data item in the other functional areas from the plurality of functional areas to  
10                    the new value to create updated configuration data; and  
11            providing the updated configuration data to the network device.

1     50.     The apparatus as recited in Claim 49, wherein the memory further stores one or more  
2             additional instructions which, when executed by the one or more processors, cause the  
3             one or more processors to perform the steps of:  
4             in response to a user adding a new data item for one of the functional areas, adding  
5                     the new data items to the other functional areas from the plurality of functional  
6                     areas to the new value to create updated configuration data; and  
7             providing the updated configuration data to the network device.

1     51.     An apparatus for updating configuration data on a network device, wherein the  
2             configuration data includes configuration data for a plurality of functional areas  
3             supported by the network device, the apparatus comprising a memory storing

instructions which, when executed by one or more processors, cause the one or more processors to perform the steps of:

displaying the configuration data on a graphical user interface;

detecting a user selection of a user interface object that corresponds to one or more data items from a first functional area from the plurality of functional areas;

in response to detecting a user selection of a graphical user interface object associated with performing a copy and paste operation, overwriting values of one or more other data items from the first functional area with values of the one or more data items to create updated configuration data; and

providing the updated configuration data to the network device.

52. An apparatus for updating configuration data on a network device, wherein the configuration data includes configuration data for a functional area supported by the network device, the apparatus comprising a memory storing instructions which, when executed by one or more processors, cause the one or more processors to perform the steps of:

displaying the configuration data on a graphical user interface;

in response to detecting a user selection of a graphical user interface object associated with performing a clone operation, generating a specified number of copies of the configuration data for a specified number of other functional areas to create updated configuration data; and

providing the updated configuration data to the network device.

1 53. The apparatus as recited in Claim 52, wherein values of the specified number of  
2 copies of the configuration data are the same as values of the configuration data.

1 54. The apparatus as recited in Claim 52, wherein the memory further stores one or more  
2 additional instructions which, when executed by the one or more processors, cause the  
3 one or more processors to perform the step of determining a value for a data item in  
4 one of the specified number of copies of the configuration data by applying an  
5 algorithm to a value for the data item in the configuration data.